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CHINESE GARDENS

BEVERLY KLING MOHLENBROCK

"A garden . . . to the Oriental . . . is any secluded spot in the earth, in the heavens or in the imagination where are garnered, cultivated and cherished certain 'flowers' or precious symbols—be they stones, or bronze, or tiles, or marble, or wood, or what not. The slightest touch of the imagination transforms and transmutes these similitudes of Nature into gardens and garlands."

A Chinese garden exemplified the harmony of the artificial with the natural—the harmony of man-made structures with natural structures. The location of every building, plant, rock, pool, and bridge was determined in terms of its blending with nature. The garden became very much like a "landscape painting in three dimensions, but like Chinese painting, it was subjective."

The Chinese learned that every possible form of rhythm was to be found in nature and made good use of this fact in their gardens, which have been called "symphon[ies] of rhythm." Disregarding their content, lines and forms were considered beautiful in themselves because of their natural rhythm. "Qualities like force, suppleness, reserved strength, exquisite tenderness, swiftness, neatness, massiveness, ruggedness, and restraint or freedom" were considered beautiful and natural in regard to lines. Similarly, qualities such as "harmony, proportion, contrast, balance, lengthiness, compactness, and sometimes even . . . slouchiness or irregularity" were considered beautiful in regard to form. Never were lines or forms straight or perfectly symmetrical, for if so, their beauty was lost.

The simplicity of the Chinese garden and its prevailing quietness were conducive to meditation and contemplation, the main purposes of a garden as established by the underlying religious philosophy. "Serenity of soul, meditation on the problems of life and conduct, contemplation of the mountains, rivers, waterfalls, trees, flowers, and stars—these were the spiritual elements that entered into the creation of a garden." A garden became an escape from reality and tension, a place where man might reach perfection through meditation. It also was a place for relaxation, a place of solitude. The builder of a garden did not intend his work of art to be used for recreational purposes, but occasionally he deviated from the main purpose of his garden and utilized it in entertaining his few choice friends. The entertainment would consist of nothing more energetic than the enjoyment of "calligraphy, painting, performing on the table lute, playing chess, writing verses, drinking wine . . . or cultivating flowers."

The philosophy created by the interwoven ideas of the two main Chinese religions, Taoism and Buddhism, was reflected in the gardens. They were built to represent the people's conception of Paradise, the design often being a replica of the semi-mythical Islands of Dawn, the Three Blessed Isles of the Eastern Sea, or of the mountains holding the Western Heaven. Heaviness and stableness were eliminated as much as possible in order to make everything appear as light and cloudlike as practicable and encourage the immortal spirits to feel at home. It was believed that by building the gardens in this manner the immortal beings, living in clouds and winds, would be pleased and would bless the garden with their presence and give immortality to the builder.

It was a Chinese belief that, by dwelling in a house situated high on a mountain, it would be possible for man to reach perfection and be swept away by the immortal beings to their heavenly abiding places on the mountain tops of Paradise. Those people who were unable to live on the mountains created them artificially in their own landscape.

Symbolism of the Chinese religions, chiefly influenced by the scholars of the Ming Dynasty (1368–1644), was applied to nearly everything in the garden. Life was symbolized by the Yin and Yang elements, the passive and active principles, the female and male forces. The Yin element was represented in "earth, water, darkness, woman, and trouble"; the Yang element was represented in "heaven, rocks and mountains, light, man, and the good." Rocks were believed to be the earthly completion of the clouds, that is, clouds in solid form, and were admired for their strange and grotesque shapes. They were gathered from lake beds, where they had been worn by the action of the water. The bent pine and budding plum trees were considered reflections of man's problems, and water was significant as the arteries of the earth. The following are some of the most important flowers and trees and what they symbolized.

Peony, wealth and honor
Peach and plum blossoms, physical charm and the loveliness of woman, as well as the spirit of the quiet, poor scholar
Orchid, culture, refinement, and nobility of character
Magnolia, associated with the idea of fragrance of virtue
Pomegranate, fruitfulness
Lotus, truth and purity
Chrysanthemum, gentility, good fellowship, and longevity
Gardenia, graceful charm
Narcissus, good fortune
Willows, grace, friendship, purity and mercy
Peach and *plum trees*, brotherliness and cordial relationships
Bamboo, fidelity, constancy, humility, wisdom, gentleness, and long life.

The Garden of the scholar and poet, which dates back to 206 B. C.–220 A. D., the period of the Han Dynasty in China, was an example of a typical Chinese Garden. Preferably located in the mountains, such gardens were occasionally found on the plains near a river. Completely surrounding the garden was a high wall, the top of which had a tile finish and a wavy appearance. In Southern China these walls were usually whitewashed, in Northern China they were built of rough stone. Similar walls were found throughout the garden and often ter-

minated as a portion of a pavilion, a hill, or a rockery. In these walls were windows, varying in design from extreme simplicity to intricate detail. A circular or octagonal gate in the form of a crescent moon, a gourd, a vase, flower petal or musical instrument led into the first courtyard of the garden. Several of these gates and courtyards were encountered before a person actually entered the garden proper.

The view through the garden gate was one of great depth, often deceptive. Through the use of concealment and suggestion, the garden was made to appear larger than it was. The entire garden could never be seen at one time, as it was divided into numerous irregular sections by winding walls, shaded corridors called promenades, and architectural structures composed mainly of wood, which merged and blended with the natural elements of the garden.

No such distinction as we know in the United States was made between the indoors and outdoors. Low-roofed buildings housed the members of the family which owned the garden. Open galleries in the form of verandas and tile-roofed pavilions, sometimes two-storied and built upon an elevated section of ground or upon stones, were located in places of vantage within the garden. Each of these galleries and pavilions was built for a specific purpose, such as to serve as a comfortable place from which to listen to the sounds of autumn—"the murmur of the leaves, the stir of homeless ghosts, the chirp of crickets, the rustling of brittle bamboo, the whirring of dragon-flies' wings," and so on—or perhaps as a place from which to view the moon as it rose over the lake, the evening sunset, the clouds in the sky, the beauty of the chrysanthemums when they were in bloom, or merely as a place where one might stop to rest and to drink some tea. The name inscribed on each of the galleries and pavilions revealed the purpose for which it was constructed. Frequently pavilions were found bordering the lake, which was a fundamental structure of the garden, or were built in the middle of the lake. A beautiful, high, arched bridge led to and from the pavilion. The curving lines of the bridge were effectively completed by their reflection in the placid water.

Paths found leading to the lake and throughout the garden added a unique touch to the beauty already established. They were constructed of very tiny grey pebbles arranged in various patterns which were outlined by thin curving stones, sometimes of a faint rose color. The color built into the Chinese garden—the red columns of the pavilions and the colored tile roofs —gave the buildings the appearance of being copied after flowers, and enabled them to "bloom" all year round. Rockery played a prominent role in the Chinese garden. Steps were constructed so as to give the impression that they were the works of Nature. Balanced rocks and rock formations containing tunnels and doorways were scattered throughout the garden, adding an unusual sight. The roughness and sharpness of this rockery was broken by the soft green hue of vines and trees, and by a brightly colored flower which would occasionally ap-

pear amidst varying shades of green.

Few lawns or open stretches of land were found in the Chinese garden, for such were considered wasteful and ugly. In contrast to Western gardens, those of China were devoted more to architecture which blended with nature than to the cultivation of lawns, trees and flowers. Nevertheless, plant life was abundant, and it served to enable the buildings to blend with nature and lose their conspicuous man-made appearance.

The main use of flowers was to decorate the interior of the Chinese homes and the courtyards. They were displayed in a series correlated with the seasons. In such a way, each season of the year was seen at its best in the numerous views of the Chinese garden.

"Competent authorities estimate the Chinese flora to contain fully 15,000 species, half of which are peculiar to the country." Of these 15,000 species, the flora that was most commonly found in a typical Chinese garden included the following:

> lotus, wisteria, laurel, begonia, jasmine, peony, iris, clematis, azalea, hydrangea, chrysanthemum, orchid, gardenia, narcissus, magnolia, pomegranate, bamboo, plum, peach, pine, juniper, cedar, willow, maple, palm, musa (banana), elm, cypress, wintersweet (perhaps *Acocanthera spectabilis*), heavenly bamboo, winter green, maidenhair tree ferns, Chinese tulip trees, and camphor trees.

The Chinese gardens can be classified into several categories. There are, of course, intermediate stages of varying degrees. The first category would include the simple house-gardens of the Chinese commoners, concentrated on utility yet revealing the beauty of nature. Small yards or miniature gardens with all the trimmings of a good-sized garden were enjoyed by people of lesser means.

The temple gardens are in a second category. Many of these were scattered throughout the Western Hills and offered beauty, peace, and seclusion to troubled minds. The Chieh T'ai Ssu, the Monastery of the Ordination, an example of one of these gardens, has been preserved due to its well-hidden location and the difficulty encountered in reaching it, even when its location is known. This garden is large, spread out, and built in a series of terraces, with the Ordination Terrace located on the summit. The Ling Yin monastery, the Spirits' Retreat, serves as another example of a preserved temple garden. Here goldfish are seen swimming in the placid pool, and awesome caves are found hollowed-out in the mountain.

A third category would be made up of the pleasure gardens of the wealthy, more elaborate in their make-up than the two previously mentioned types. During the latter part of the Sung Dynasty (960–1277 A. D.), Hangchow became the site of many of these beautiful gardens. From 1368 to 1644 A. D., the period of the Ming Dynasty, the greater number of these were centered in the vicinity of Soochow, the most beautiful and most prized being the Liu Yuan, The Lingering Garden. The Liu Yuan still exists today and is a "series of courtyards and garden rooms, dependent on each other and inseparable." Another of China's prized pleasure gardens, built in Soochow in the year 1342 A. D., was the Shih Tzu Lin, the Lion Garden. The

Shih Tzu Lin has been described as "one large rectangle around which an endless number of charming perspectives has been created." These "charming perspectives" are composed of picturesque rocks. This particular garden is the only famous Chinese rock garden which has survived.

Chinese pleasure gardens deviated from the idea of extreme simplicity in garden design, but their luxury was far surpassed by the imperial gardens, which were built by each of the imperial families after the unification of the Chinese Empire (third century B. C.). These imperial gardens combined the basic form, purpose, and philosophical symbolism of the typical Chinese garden with magnificence, extravagance, and vastness.

The elite of the Chinese gardens were clustered about the imperial garden and migrated with it as it moved from one place to another with each change of dynasties. This change was brought about directly by the Chinese people who marveled at the splendor of the imperial gardens and delighted in hearing tales of their magnificence but revolted against such luxury and extravagance when the oppression of the ruler and the heavy burden of taxation could no longer be endured. As a result of this popular uprising, a new dynasty would come into power, and it too would create magnificent gardens at the expense of the people, until once again revolt would bring another new dynasty into power. Because of this sequence of events, it can be said that "the history of China is the record of her gardens."

The imperial gardens reached their peak during the Ch'ing Dynasty (1644–1911). They were built northwest of Peiping and near the foot of the Western Hills. The largest and most splendid of all the Chinese imperial gardens was the Yüan Ming Yüan, built in 1709 by Emperor K'ang Hsi of the Ch'ing Dynasty. This fabulous garden was said to have contained literally hundreds of individual gardens, and it was distinguished from all others by its air of refinement and mist of privacy.

In addition to the basic requisites of a Chinese garden, the Yüan Ming Yüan possessed a system of canals, a multitude of buildings, and an abundance of plant life. The canals divided it in such a way as to create numerous islands and valleys. These canals were reported to appear as works of nature rather than works of human beings. They were irregular in width and wound gracefully between the hills. The rocks which lined the canals were of various sizes, shapes, and designs and added to the desired natural effect of the structure. The buildings included the "dwellings of the numerous members of the Emperor's large family, . . . halls for audience and for meeting officials, an ancestral shrine, temples, libraries, theatres, farm buildings, . . . a drill field for archery contests, a workshop for the artists, boathouses, . . . numerous pavilions and covered porches of various shapes and sizes." These buildings, which were located on the many islands of the garden, were connected by a network of courtyards, covered passageways, and bridges. Waterfowl swam on the lakes of the garden, and fish of gold,

silver, and copper lived in the pools. In addition to the plants commonly found in Chinese gardens, the Yüan Ming Yüan was graced with the beauty of lilies, wu t'ung trees *(Sterculia platanifolia)*, reeds, and apricot trees, as well as rice and grain fields.

The combination of all the splendors of the Yüan Ming Yüan attracted, among others, Jesuit missionaries who, in the seventeenth century, aroused European interest in Chinese gardens by describing them in their letters. As a result of this interest which increased rapidly in the eighteenth century, Europe's very stiff and formal style of gardening gave way to a style greatly influenced by China. The first person to introduce the Chinese gardens into Europe was Sir William Chambers, who, in 1750–1757, built the first Chinese garden in England. The new Chinese-English garden style was gradually carried into France, Germany, and other parts of Europe.

During the early and middle nineteenth century, the power and influence of the Ch'ing Dynasty were declining, but China haughtily continued to claim universal authority. Her attitude and policy of resistance to foreign demands for trade concessions in China resulted in the French and British campaign of 1860 against her. This campaign led to the evacuation and doom of Yüan Ming Yüan. British and French soldiers looted all the treasures possible from this imperial garden, and the objects which were too large to be taken were broken and widely strewn. The remainder was destroyed by small fires started by the soldiers.

Finally a truce was made among the belligerents, and it seemed as though peace was to be restored; that is, until the Chinese were discovered treating the French and British prisoners cruelly under the flag of truce. Upon receipt of this knowledge, Britain sent Sir John Michel and his forces to burn the Yüan Ming Yüan as revenge for the ill treatment afforded the war prisoners. These troops carried out their orders well and went so far as to burn adjacent gardens and those miles away.

The destruction of the treasures of art and literature of the Yüan Ming Yüan was total, but a few of the architectural structures remained standing. In 1873 a few minor repairs were made on the remnants of the garden, but it was kept closed. In 1900 once again the palace garden was raided, and after that the Yüan Ming Yüan ceased to exist. Its annihilation has been an irreplaceable loss, not only to the Emperor and the people of China, but to all cultured peoples of the world.

The dramatic end of the Yüan Ming Yüan signified the end of a glorious empire, the remains of which today are seen faintly in the New Summer Palace, outside Peiping, which was built just after the destruction of Yüan Ming Yüan in the campaign of 1860. The payment of a gate fee enables a person to visit these palace grounds today.

In northern China the Sea Palaces also represent what was at one time the romantic atmosphere of the long vanished imperial gardens. Most of this

atmosphere has been lost, due to the fact that the Sea Palaces have been converted into recreational areas, open to the public. Such innovations as these are absolutely incompatible with the original Chinese concepts of a garden.

The sites of many of the old Chinese palace gardens are now occupied by modern institutions, such as Tsing Hua University, Yenching University, military garrisons, flying fields, an orphanage, a trade school, hotel, hospital, and numerous summer cottages.

Although many of the beautiful Chinese gardens have been destroyed by wars, the influence of the basic simplicity, fundamental purpose, and philosophical symbolism of the Chinese gardens has enabled us to realize that a garden is an art to be enjoyed by all —the people of great wealth as well as the people with only small areas of land "lying just beyond their windows."

THE GARDENS OF CHINA EXISTING TODAY

Hangchow—The Gem Spring of the Dancing Fish, Yu Ts'uan; The Island of the Three Pools of the Moon's Reflection; The Monastery of Pure Compassion, Chin Tz'u Szu; The Monastery of Secluded Light, T'ao Kuang; The Pavilion from Which the Storks Went Forth; Pavilion of the Lake's Heart; The Spirits' Retreat, Ling Yin . . . ; The Upper Monastery of India, Shang T'ien Chu; The Villa of the Liu Family.

Nanking—Only a few fragments remain.

Peking—The Black Dragon Pool, Hei Lung Tang; The Forbidden City; The Garden of Smiling Harmony . . . Summer Palace; many Private Gardens that must be visited by means of letters of introduction; Monastery of the Ordination, Chieh T'ai Ssu; The Peony Gardens of Tung Hsiao Ssu; Tan Che Ssu; The Temple of the Azure Cloud, Pi Yun Ssu; Wo Fu Ssu.

Shanghai—Chang Yuan; Pang Sung Yuan; The Willow Pattern Bridge (undoubtedly the central portion of a Chinese garden); Yu Yuan.

Soochow—The Autumn Garden, He Yuan; The Forest of Lions, Shih Tze Lin; Garden of the Anhuei Guild, Hui Yin Yuan; The Lingering Garden, Liu Yuan; The Returned Garden, Fu Yuan; The West Garden of the Hsu Family . . . , Si Yuan; Yi Yuan, on the site of a Ming garden.

Yangchow—Hsiao Chin Shan; Ping Shan T'ang.

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BOOK REVIEW

African Violets, Gloxinias and their relatives: a guide to the cultivated Gesneriads. By Harold E. Moore, Jr. Illustrated by Marion Ruff Sheehan. 323 pp., 5 colored plates, 50 line drawings. The Macmillan Co., New York, 1957. Price $10.00.

HERE is a book long needed to straighten out the Gesneriaceae family.

Part I has chapters telling where the Gesneriads grow in nature; and how to handle them under culture—their propagation, pests, diseases and remedies.

Part II deals with the kinds of Gesneriads, of which over 100 are listed, and includes a key to the cultivated genera. There are five color plates and more than 40 line drawings illustrating nearly every species described, which will help the grower to identify his plants.

A guide to pronunciation, the meaning of names and a glossary rounds out a well written book.

Although written more for the student of the Gesneriaceae, it is of more than passing interest to those who grow African Violets, Gloxinias and a few other members of this family.

—Armyn Spies

HIBISCUS FOR ST. LOUIS GARDENS

E. L. EVINGER

MENTION the name Hibiscus in garden circles and you will find your listeners will have a wide and quite divergent idea of the species of flower to which you refer. Much of this confusion is due to the fact that many varieties of *Hibiscus syriacus* (the most common species grown in the St. Louis area) are known popularly as "Shrubby Altheas" thus they are thought to be in the genus Althea to which the Hollyhock, another member of the Mallow family, belongs. More properly *Hibiscus syriacus* is known as the "Rose of Sharon." Few other species are well-known locally.

The Mallow family (the Malvaceae), to which Hibiscus belongs, consists of some thirty-nine genera and from eight to nine hundred species distributed over the entire world, with the exception of the Arctic region. Tropical America has the largest number of species growing most abundantly. There are relatively few members of the family with any commercial value or importance; of these few, the best-known are Cotton (*Gossypium* spp.) and Okra (*Hibiscus esculentus*). The Mallows all contain a mucilaginous substance, at one time used in making confection, and the source of the name "Marshmallow." Such species as *Hibiscus cannabinus* of the Old World tropics contain a fibre used in making a sort of jute called Indian Hemp or Bastard jute.

The ornamental Mallows of prominence, in addition to the Rose of Sharon, are the herbaceous, biennial

Hibiscus syriacus "Coelestis"

Hollyhock *(Althea rosea)* and the Swamp Rose-Mallow *(Hibiscus moscheutos)*; other new and exciting varieties of such species as the Rose of China *(Hibiscus rosa-sinensis)* must be kept in the greenhouse or be protected during winter.

Members of the Mallow family are herbs, shrubs, or trees, with alternate, simple, and mostly palmately veined or lobed leaves. The open, bell-shaped flowers are regular and bisexual, with five sepals, five petals and numerous stamens. The family is characterized by the fusion of the many stamens into a tube which is often also fused at the base with the petals and which encloses the ovary and style, the many anthers branching off from the surface of the tube at various levels.

An old name of unknown Greek or Latin origin, HIBISCUS *is now applied to those Mallows whose seeds are borne in a five-celled capsule* that is dry or

more or less dehiscent (splitting regularly), thus distinguishing Hibiscus from the genus ALTHEA, *whose seeds are borne in a whorl or disc.* The flowers, often large and showy, are scarlet, pink, white, yellow or combinations of these colors. The calyx is five-toothed or parted and the bracts or bracteoles at the base of the flower or pannicle may be few to many and broad or narrow. Anthers are borne over much of the length of the staminal column. The pistil (most of which can be seen only by slitting the staminal column) has a style divided at the tip into five distinct slender and spreading branches, and the ovary is made up of many united carpels which form the capsule fruit. Seeds are kidney or bean-shaped and few to many in each of the five cells.

Hibiscus or Rose-Mallow is a varied genus, with species widely distributed in the temperate and tropical countries. It is made up of herbs, shrubs, or even small trees. There are between one hundred fifty and two hundred species, of which about seven (with several varieties) are adaptable or have promise for use in St. Louis gardens. They are most suitable for border plants or occasionally as accent groups.

Hibiscus militaris Cav. This species is an herbaceous perennial, growing four to six feet high. The leaves are glabrous or nearly so, dark green, rather small, hastate (with two short lobes at the base), the middle lobe ovate-lanceolate or triangular-lanceolate, long-acuminate and equally crenate toothed; the upper leaves are halberd formed (these spear-shaped leaves give the plant a military appearance, hence the name militaris). The bracts or bracteoles are linear or awl-shaped and nearly or quite half as long as the calyx. The flowers are three to five inches across, white, bluish or pale rose with a purple eye. The fruit is enclosed in an inflated calyx; the seeds are hairy or fuzzy.

This is a hardy, fine species for use in wet places. No selections or variations yet named are in the trade.

Hibiscus coccinius Walt. This is a perennial herbaceous species that grows from three to ten feet high and is known for its large rose-red or crimson flowers that are five to six inches across and borne in the upper leaf axils. The leaves are digitately or somewhat pedately three- to five-parted, the divisions slender, acuminate and remotely toothed. The bracts or bractioles are very narrow and mostly bristle-shaped, about one inch long, and shorter than the large ovate-lanceolate pointed calyx lobes. The petals are obovate and much narrowed at the base so that they stand well apart. The staminal column with the enclosed style is very long. Fruit capsule is ovoid and about an inch long.

This species is of doubtful hardiness in the St. Louis region, which is the northernmost limit of its natural range; it may need to be carried through the winter in a cellar or cold-frame. Further investigation may find strains of hardy character for general local use.

Hisbiscus lasiocarpus Cav. This plant is a perennial herb, growing to six feet. It has pubescent stems and leaves, the leaves are ovate to more or less cordate and are slightly three-lobed. The bracteoles are angular and

bristly. The flowers are white or pale rose with a darker center. This species is a native of the swamps from Kentucky westward and south. It is slightly out of range in this region and of no special interest.

Hibiscus moscheutos Linn. (*H. palustris* Linn.) This is the Swamp Rose-Mallow, a vigorous-growing, perennial herb reaching eight feet or more. The stems are hairy or even woolly, the leaves which are mostly ovate and entire, though sometimes three lobed at the tip, are crenate-toothed and very soft-woolly becoming nearly or quite glabrous on upper surface. The bracts or bracteoles are linear, nearly or quite as long as the woolly, triangular-ovate calyx. Flowers of the Swamp Rose-Mallow are very large, from four to even eight inches across, and are light rose color in the native form. The fruit capsule is globose-ovoid and glabrous.

Naturally occurring in marshes, the Swamp Rose-Mallow is native along the east coast from Massachusetts to Florida and westward to Lake Michigan. It can be easily adapted to garden culture, since it does well in wet or poorly drained spots and thrives in any good garden soil. This is one of the best and easiest to cultivate of the Rose-Mallows; it needs only to be cut back during the dormant season. The foliage is sturdy and effective and the plant blooms in August and September.

The Swamp Rose-Mallow is the most generally cultivated of the hardy herbaceous perennial types of Mallows. Soon after the turn of the century several varieties of this species appeared some of which may yet be found in old gardens. They were, however, not constant; and obtaining a good strain seemed a matter of chance. The only propagation was from crown divisions —a long and slow process and not very practical or widely used. Named varieties now appearing commercially include: "Anne J. Hemming," bright red; "Crimson Eye Rose-Mallow," white with red eye; "Clown," white with pink veins; "Crimson Wonder," bright vermilion red; "Fresno," silvery pink, giant size; "Satan," deep dark crimson; "Poinsettia," bright scarlet; "Avalon," blush-pink to red. There is also a grafted form named "Rainbow Rose of Sharon" now offered on the market which has branches bearing white, red, and blue flowers, separately, on the same bush.

Hibiscus oculiroseus But. Crimson Eye Rose-Mallow. This species is often classified as a variety or form of *H. moscheutos*, from which it differs only by having white flowers with crimson centers; and in fact it may be the variety referred to by this name above.

Hibiscus incanus Wendl. This species also is much like *H. Moscheutos* and sometimes passes for it in the trade. The leaves are smaller and narrower, ovate-lanceolate, rarely lobed, and serrate-toothed. The flowers are sulphur-yellow, pink or white with a crimson eye. This species seems to be hardy in our region but may need the protection of a heavy mulch in winter.

Hibiscus syriacus Linn. The Rose of Sharon or Shrubby Althea. For local gardens this species and its varieties are the most interesting and most promising of the Hibiscus. The Rose of Sharon is a shrub six to twelve feet

high, sometimes almost tree-like, much branched and nearly or quite glabrous. The leaves are rather small, short-petioled, three ribbed and triangular or rhombic-ovate. The lower leaves are mostly three-lobed with many rounded teeth or notches. The bracteoles are linear, six or seven in number and shorter than the sepals. The flowers, solitary in the axils on the young wood, are short-peduncled, somewhat bell-shaped and two or three inches in width and length. The petals are rose or purple, usually darker at the base in the original species.

The exact origin of the Rose of Sharon is not known. It was introduced into Western Europe before 1600, probably from India or the Eastern Mediterranean region. It is now one of the most common ornamental shrubs and is quite hardy in this area. A feature of old fashioned gardens from colonial times, it seemed for a while to have lost favor to other flowering shrubs, but is now coming into its own again largely due to the habit of free-flowering in late summer after other shrubs have passed their peak of bloom. Also new varieties are showing great promise and may, in time, rival those of the already famous tropical species and varieties of Hibiscus. Its culture is easy if it is given a little protection from sudden freezing and thawing. This can be done by placing the plant away from an extreme northern exposure and by mulching. Little pruning is required.

Listed below are the old and some of the new improved varieties of Rose of Sharon now being offered. They differ from one another largely in the size and color of the flowers and by the leaf varigations. (Asterisk indicates plants which may be seen growing in a Hibiscus planting in the knolls in the Missouri Botanical Garden, although some of the varieties are yet quite small and cannot be observed in flower this season.)

"Anemone flora", flowers double pink
"Ardens"*, flowers double violet or purple
"Admiral Dewey", pure white double
"Banner", bluish, double
"Boule de Feu"*
"Celestial Blue"*, light blue
"Coelestis"*, purplish blue
"Crimson wonder", deep, dark red or crimson
"Flora plena", double white
"Foliavarigata"*, variegated leaves
"Grandiflorus superbus", large pink
"Jean de Arc"*, double white
"Hamabo", pale bluish with large carmen blotch at the base of petal
"Lady Stanley", white-shaded rose, double
"Lucy"*, double bright red
"Monstrosus", double red
"Paenoflorum"*, double pink
"Pulcherima"*, pink and white
"Purpurea semiplena"*, double purple or bluish
"Rosea", white crimson eye
"Rubis", red
"W. R. Smith"*, pure white
"Speciosa plena", double, pinkish-striped or blotched with deep rose
"Totus albus"*, pure white
"Woodbridge"*, clear rose-pink to red
"White red-eye"*, white with red center.

RESEARCH IN BREEDING TROPICAL WATER LILIES

GEORGE H. PRING

THE successful introduction of the yellow day-blooming tropical water lily, *Nymphaea Burttii* (Annals of the Missouri Botanical Garden, Vol. 20, 1933), opened up an entirely new field in water lily breeding for the writer. *Nymphaea Burttii* was introduced into cultivation by the Garden in 1929 from seeds sent by Mr. B. D. Burtt, botanist for the Tsetse Research Bureau, Kondoa, Tanganyika. Several hybrids, derived from Burttii, have been introduced into the commercial trade and amateur collections. These include: "Saint Louis," 1932; "Yellow Star," 1932; "African Gold," 1941; and "Sunbeam," 1941. The latter is a viviparous type, producing young plants from the center of the fully developed leaves.

The parent species, *N. Burttii*, unfortunately is a very poor propagator from tubers; although tubers are formed they fail to grow into young plants. This defect did not show up in the first generation hybrid, "Saint Louis"; but it definitely did in the later hybrids produced from it.

To obtain a hybrid with a deeper yellow, the good propagator, *N.* "Saint Louis," was selected to back-cross to *N. Burttii*. The result was an excellent dark-yellow hybrid, named *N.* "African Gold," which was, however, a poor propagator from tubers and was also sterile. The commercial growers were disappointed in the poor reproductive qualities inherited from the parent *N. Burttii*, and hoped that future research would produce a good, dark yellow which they could propagate annually. From the amateurs the request was: "You have originated many large hybrid water lilies in varied colors suitable for large pools. Why don't you develop small water lilies to fit our small pools?"

I accepted the challenge and visited the Kew herbarium in England the following year, 1948, to search through the water lily collections. Tropical pygmy water lilies had not been introduced into cultivation; however, two perfect specimens (*Nymphaea sulfurea*, yellow; and *N. Heudelotii*, white-shaded, pale blue), were found and studied. Both of these species presented the opportunity for research in breeding smaller water lilies. Dr. H. S. Conard, an authority on water lilies, writing of the tender day-blooming kinds, states:

"There are two treasures awaiting introduction and which promise great things. Africa hides in its vast interior two yellow tender species allied to the present blues and whites. One has excellent double flowers six or seven inches across—*Nymphaea Stuhlmannii*. The other, *Nymphaea sulphurea*, is a pigmy with flowers and leaves two to three inches in diameter. Aside from their individual attraction, think what a future they offer for hybridization! It is earnestly hoped that they will not long be absent in our gardens."

Twenty-five years later on August 30, 1949, through the efforts of Mr. Robert Trickett of Kew, a tuber of *N. sulfurea* collected by Mr. P. J. Greenway in Northern Rhodesia, was re-

ceived at the Garden. Despite its dehydrated condition upon arrival, the tuber was successfully grown in a half-barrel and it flowered the summer of 1950. On February 7, 1950, seeds of *N. Heudelotii* collected by Mr. R. D. Meikle of Kew Gardens while on a visit to Nigeria, arrived from Mr. Trickett. Upon arrival the seeds were immediately sown in pans and placed in the propagating tanks in the greenhouse. Excellent germination soon appeared, the first flowering plant being grown in a half-barrel. To increase the stock, self pollinations were made the first season for seed production. Again the Garden is credited with being the first to introduce new species of Nymphaea into cultivation (Missouri Botanical Garden Bulletin, 1951).

Experience has proved that the breeder of water lilies is limited to intercrossing within sub-groups of the Nymphaceae; for example, the hardy pygmy water lilies, *N. tetragona* (white), and the hybrids "helvola" (yellow), and "Jo-Ann Pring" (pink), belong to the Castalia group which are not compatible with the recently introduced pygmies of the Brachyceras group. To produce new tropical pygmy water lilies in varied colors will necessitate a long-range breeding program, since only large-flowering types are available for pollination with the tropical pygmies.

During August 1951 the writer started pollinations between *N. Heudelotii* and *N. colorata* which resulted in a medium-sized, pale blue hybrid named "Bluet." It is a very poor propagator that is almost sterile and consequently of botanical interest only. *N. sulfurea* crossed with *N.* "African Gold" produced a medium-sized dark yellow hybrid, *N.* "Saint Louis Gold," with all the floral characters of *N. sulfurea*. With several seasons testing it has proved to be a desirable hybrid for small pools and is as well a free-flowering lily during the early spring in the greenhouse, particularly in small pots. *N.* "Saint Louis Gold" is now listed in the commercial catalogs as suitable for small pools.

A cross between *N. sulfurea* and *N.* "Saint Louis" has produced a yellow hybrid which satisfies the connoisseur and is now in the trade catalogs for distribution. It is named in memory of Lt. R. Bradford Pring, a pilot in World War II. It possesses hybrid vigor, is an excellent propagator from bulbs (a characteristic from its ancestor, *N.* "Saint Louis"), and it is viviparous and very fertile. *N. sulfurea* has influenced both its color and fertility. *N.* "Aviator Pring" is a very good indoor winter-flowering hybrid.

Frequently amateurs will ask how long it will take before a new lily is originated and distributed. For example, in the production of "Aviator Pring" and "Saint Louis Gold" the pollinations for the crosses were made in August 1952. The hybrids flowered the following year. Both hybrids were distributed for sale in 1957. The intervening period was necessary for a series of tests to ascertain the abilities of reproduction from tubers and for the production of sufficient stock for distribution. Hybrids that are viviparous producing piggy-back plants are assured of speedy reproduction.

× NYMPHAEA "AVIATOR PRING" (BRACHYCERAS), PRING

N. capensis zanzibariensis f. *rosea* ♀ × *N. capensis zanzibariensis* f. *rosea* ♂

N. capensis zanzibariensis cv. castaliiflora ♂ × *N. ovalifolia* ♀

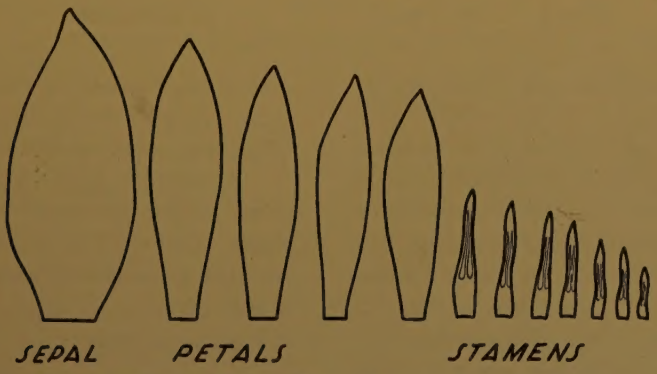
N. ovalifolia ♀ × *N.* "Mrs. Edwards Whitaker" ♂

N. "Mrs. George H. Pring" ♀ × *N. Burttii* ♂

N. sulfurea ♀ × *N.* "St. Louis" ♂

N. "Aviator Pring"

Hybrid vigor is shown up in this new primrose yellow hybrid. This is the first yellow variety that meets all the requirements of the grower. It is a good propagator and is occasionally viviparous. This variety has exceeded all expectations regarding size of a flower.



Nymphaea "Aviator Pring". About ⅓ natural size. (See Cover.)

Description—Flowers 9-10 inches across; bud narrowly ovoid, pale green; peduncle brown; sepals 4, ovate-oblong, hooded at the apex, 2 inches wide, 5 inches long, outer surface pale green, primrose yellow within; petals 40–42, primrose yellow, 4 rows, outermost row lanceolate, obtuse, 4½ inches long, 1 inch wide, occasionally suffused with green as in the sepals; stamens 265–270, 7 rows, outermost row 2 inches long, 5/16 inches at the spatulate base, pale yellow at the apex, golden yellow toward the base; carpel-

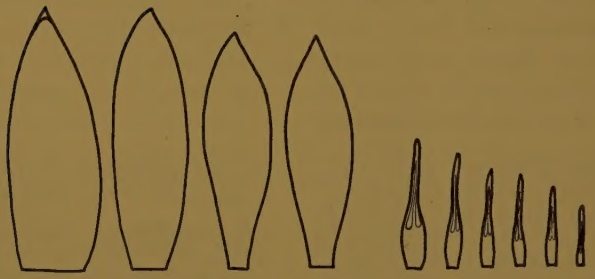
lary styles 33–36, primrose yellow, stigma concave, lemon chrome, slightly darker than the base of the stamens; seed pod 2–3 inches in diameter; leaves orbicular, 14–16 inches diameter, pale green above, below dark blue to violet, veins green, margins wavy or undulated, viviparous at the insertion of the petiole, brown, sinuses open. (Ridgway color standard used.)

× NYMPHAEA "SAINT LOUIS GOLD" (BRACHYCERAS), PRING

N. Burtii ♀ × *N.* "Saint Louis" ♂

N. "African Gold" ♂ × *N. Sulfurea* ♀

N. "Saint Louis Gold"



Nymphaea "St. Louis Gold". About ⅓ natural size.

Description—Flowers 7–8 inches across; bud narrowly ovoid, dark green; peduncle brown; sepals 4, ovate-oblong, hooded at the apex, 1¼ inches wide, 4 inches long, outer surface dark green, within citron yellow; petals 20–22, citron yellow, comprising 3 rows, outermost row lanceolate, obtuse 3¾ inches long, 1 inch wide; stamens 115–120, 6 rows, outermost row 1¾ inches long, 5/16 inch at the spatulate base, primuline yellow; carpellary styles incurved, primuline yellow; stigma concave, primuline yellow; seed pod 1½–2 inches in diameter; leaves, orbicular, 10–12 inches in diameter, dark green, marmorated with chocolate above, margins wavy or undulated, below dark green, flushed pale blue, venation green, petiole brown, sinuses open. (Ridgeway color standard used.)

A medium sized lily producing citron yellow flowers 7 to 8 inches across. Leaves 10 to 12 inches across are dark green flushed with chocolate brown fading green with age. Suitable for small pools.

Nymphaea "St. Louis Gold"

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SOME FACTS ABOUT SHAW'S GARDEN

The Missouri Botanical Garden (the official name chosen by Mr. Shaw) carries on the garden established by Henry Shaw over a century ago at TOWER GROVE, his country home. It is a private institution and has no support from city or state. The old stone walls and cast-iron fences, the Linnaean House, the Museum, the Mausoleum, and the TOWER GROVE mansion all date from Mr. Shaw's time. Since his death, as directed in his will, the Garden has been in the hands of a Board of Trustees who appoint the Director.

The Garden is open every day in the year (except New Year's and Christmas) from nine A. M. until seven P. M. spring to fall and until six in the winter time though the greenhouses close at five. TOWER GROVE, itself, Mr. Shaw's old country home, is open from one until four, admission twenty-five cents, with special guides. The Garden is nearly a mile long and has several entrances. The Main Entrance, the one most used by the general public, is at Tower Grove and Flora Place on the Sarah bus line (No. 42). The Park Southhampton buses (No. 80), direct from downtown, pass within three blocks of this entrance and stop directly across the street from the Administration Building at 2315 Tower Grove Avenue. The latter is the best entrance for students, visiting scientists, etc. It is open to such visitors after 8:30 A. M., but is closed on Saturdays, Sundays, and holidays. The step-in gate (more or less concealed by the big Cleveland Ave. gate, 2221 Tower Grove) is nearly always open, and there is a service entrance on Alfred Avenue, one block south of Shaw Avenue.

Since Mr. Shaw's time an Arboretum has been developed at Gray Summit, Mo., adjacent to State Highways 50 and 66. It is open every day in the year and has auto roads as well as foot trails through the wild-flower reservation. There is a pinetum and an extensive display of daffodils and other narcissi which are at their best in April.